

## 5. Onroad Mobile Sources

### 5.1 Introduction

Onroad mobile source emissions for ozone precursors, such as volatile organic compounds (VOCs), nitrogen oxides (NO<sub>x</sub>), and carbon monoxide (CO), have been calculated for the eight-hour ozone nonattainment area (NAA) and Maricopa County for the 2011 Periodic Emissions Inventory (PEI).

Motor Vehicle Emission Simulator (MOVES2010b) is the latest model developed by the U.S. Environmental Protection Agency (EPA) for the purpose of estimating onroad and off-network motor vehicle emission factors.

The MOVES2010b modeling accounted for the oxygenated fuel and the Arizona Vehicle Inspection/Maintenance (I/M) programs applied in Maricopa County in 2011. The fuel use assumptions, including oxygen content and Reid Vapor Pressure (RVP), were derived from the 2011 fuel inspection results provided by the Arizona Department of Weights and Measures.

In order to develop the 2011 onroad mobile source emissions, the 2011 vehicle miles traveled (VMT) estimates by facility type and road type were derived from the 2011 Highway Performance Monitoring System (HPMS) data provided by the Arizona Department of Transportation (ADOT). The distribution of VMT by vehicle type is based on the July 2011 vehicle registration data for Maricopa County provided by ADOT. The VMT by vehicle type was provided as local input data for MOVES2010b to produce onroad emissions.

The main references for preparing the onroad mobile source portion of the 2011 emissions inventory were:

- Emission Inventory Requirements for Ozone State Implementation Plans (US EPA, 1991);
- Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (US EPA, 1992a);
- Quality Review Guidelines for 1990 Base Year Emission Inventories (US EPA, 1992b);
- User's Guide for the SMOKE-MOVES Integration Tool (US EPA, 2010);
- Motor Vehicle Emission Simulator (MOVES) - User Guide Version, MOVES2010b (US EPA, 2012a);
- Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes (US EPA, 2012b); and
- Using MOVES to Prepare Emissions Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b (US EPA, 2012c).

### 5.2 Onroad emissions

Vehicle exhaust and evaporative emission factors for VOC, NO<sub>x</sub>, and CO were calculated using MOVES2010b. The MOVES2010b runs were executed by MAG. The contact person for the MOVES2010b emission estimates is Ieesuck Jung (602-254-6300).

### **5.2.1 MOVES2010b model**

The emissions were calculated using MOVES2010b. MOVES2010b is EPA's state-of-the-art emissions modeling tool, which replaces EPA's previous mobile source emissions model, MOBILE6.2. MOVES2010b is intended for official use to estimate national, state, and county level inventories of criteria air pollutants from highway vehicles. The user of MOVES2010b is allowed to specify vehicle types, time periods, geographical areas, pollutants, vehicle operating characteristics, and road types for a particular scenario to be modeled by creating a Run Specification (RunSpec).

In order to calculate vehicle emissions for the calendar year 2011, MOVES2010b was executed using local input data for each month of the year and each geographical area (the eight-hour ozone nonattainment area and Maricopa County). Each scenario was created using the County Domain/Scale and the Inventory Calculation Type. The specific MOVES2010b model RunSpec and RunSpec summaries are described in Appendix C.

### **5.2.2 MOVES2010b local input data**

Compared with MOBILE6.2, MOVES2010b requires a more detailed level of local data, including fuel data, I/M program, meteorological data, vehicle population, source type age distribution, annual VMT, monthly/daily/hourly VMT fractions, road type distribution, average speed distribution, ramp fraction, and Alternative Vehicle and Fuel Technologies (AVFT) strategy.

#### **5.2.2.1 Fuel data**

Regarding the fuel local input data, MOVES2010b provides two MOVES tables, which are [fuelsupply] and [fuelformulation]. The fuel data for each month were derived from the 2011 fuel inspection results in Maricopa County provided by the Arizona Department of Weights and Measures. The 2011 fuel inspection results reflected the committed control measure – California Phase 2 Reformulated Gasoline with (1) 3.5% Oxygen Content from November 1 through March 31 (MAG, 2003) and (2) 7 psi from May 1 through September 30 (MAG, 2009). The fuel data for Maricopa County were also applied to the eight-hour ozone nonattainment area. The specific MOVES tables for fuel data are presented in Appendix C.

#### **5.2.2.2 I/M programs**

MOVES2010b has an [IMCoverage] table for I/M programs; this table was prepared using MOBILE6.2 input. This table reflects the actual proportions of vehicles subject to the specified levels of inspection. The term "I/M vehicles" denotes vehicles which are required to undergo an emission test and/or inspection under the Vehicle Inspection/Maintenance Program. It is important to note that participation in the I/M program is required for all vehicles registered in Area A, with the exception of certain model years and vehicle classes. However, it is assumed that 91.6 percent of the vehicles operating within the eight-hour ozone nonattainment area and Maricopa County participate in the I/M program and the remaining 8.4 percent do not participate in the program. These percentages reflect the control measures "Tougher Enforcement of Vehicle Registration and Emissions Test Compliance" and "Expansion of Area A Boundaries," described in the MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the

Maricopa Nonattainment Area (MAG, 2009). This percentage is directly applied to the Compliance Factor in the [IMCoverage] table. The same I/M programs were applied for the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table for I/M programs is presented in Appendix C.

#### 5.2.2.3 *Meteorological data*

MOVES2010b requires hourly temperature and relative humidity data by specific month of the year. Meteorological data for the Phoenix Sky Harbor International Airport in 2011 were obtained from the National Climatic Data Center (<http://www.ncdc.noaa.gov/>). The same hourly average temperature and relative humidity data for each month were applied for the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table [ZoneMonthHour] for meteorological data is presented in Appendix C.

#### 5.2.2.4 *Vehicle population*

In order to capture start, evaporative, and extended idle emissions, MOVES2010b introduced a new mobile source emission category called off-network emissions. In MOVES2010b, these off-network emissions are directly determined by population of vehicles in an area. The vehicle population in Maricopa County was obtained from the July 2011 vehicle registration data provided by ADOT. The vehicle population data were allocated to the 28 MOBILE6.2 vehicle types based on MOBILE6.2 VMT fractions for 2011. Then, the vehicle population data allocated to the 28 MOBILE6.2 vehicle types were assigned to the 13 MOVES source types using the match-up table (Table A.1) in EPA's technical guidance (EPA, 2012c). The vehicle population in the eight-hour ozone nonattainment area was estimated by applying the population ratio of the two geographical areas to the vehicle population in Maricopa County. The specific MOVES table [SourceTypeYear] for vehicle population is presented in Appendix C.

#### 5.2.2.5 *Source type age distribution*

MOVES2010b categorizes vehicles according to vehicle classes and model years. The source type age distribution was prepared using EPA's data converter that takes the registration distribution input file created for MOBILE6.2 and converts it to the appropriate MOVES age distribution input table [SourceTypeAgeDistribution]. The same source type age distribution was applied for the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table for source type age distribution is presented in Appendix C.

#### 5.2.2.6 *Annual VMT*

The 2011 daily VMTs by facility type were used to estimate onroad exhaust and evaporative emissions. The 2011 VMT distributions by facility type for the eight-hour ozone nonattainment area and Maricopa County were obtained from the 2011 Maricopa County Estimates of Daily Vehicle Travel by Highway Functional Classification provided by ADOT. The 2011 VMT distributions were multiplied by the 2011 HPMS VMT for the eight-hour ozone nonattainment area and Maricopa County. The resultant VMT estimates by facility type for the eight-hour ozone nonattainment area and Maricopa County are shown in Table 5.2-1.

Since MOVES2010b requires annual VMTs by HPMS vehicle type as a local input, the daily VMTs by HPMS vehicle type were derived from the 2011 traffic assignment data provided by

the MAG transportation modeling group in May 2011 and the daily VMTs by facility type and the estimated percentages of daily vehicle travel by vehicle type and highway functional classification provided by ADOT. Then, the daily VMTs by HPMS vehicle type were multiplied by 365 days to obtain the annual VMTs by HPMS vehicle type. The specific MOVES table [HPMSvTypeYear] for annual VMT is presented in Appendix C.

**Table 5.2–1. 2011 daily VMT by facility type (annual average daily traffic).**

	Facility Type	8-hr ozone NAA (thousand miles/day)	Maricopa County (thousand miles/day)
Rural	Interstate	1,833	3,247
	Other Principal Arterial	897	1,589
	Minor Arterial	166	293
	Major Collector	734	1,301
	Minor Collector	95	168
	Local	149	264
Urban	Interstate	10,906	11,182
	Other Freeway/Expressway	19,263	19,750
	Other Principal Arterial	21,474	22,017
	Minor Arterial	13,767	14,115
	Collector	4,680	4,799
	Local	9,910	10,160
<b>Total:</b>		<b>83,874</b>	<b>88,885</b>

#### 5.2.2.7 Road type distribution

MOVES2010b requires the distribution of VMTs by road type as a local input. The road type VMT distribution by HPMS vehicle type was derived from the 2011 traffic assignment data and the daily VMTs by HPMS vehicle type mentioned in the previous section. As suggested in EPA’s technical guidance (US EPA, 2010), the same road type distribution by HPMS vehicle type was used for all MOVES source types within an HPMS vehicle class. The specific MOVES table [RoadTypeDistribution] for road type distribution is presented in Appendix C.

#### 5.2.2.8 VMT fraction

Since VMT varies by month, day of week, and hour, MOVES2010b requires month/day/hour VMT fractions as a local input in order to derive hourly VMT for each weekday/weekend and month from the annual VMT. The month/day/hour VMT fractions were developed from data recorded by continuous traffic counters on freeways (ADOT Freeway Management System) and arterials (Phoenix Automatic Traffic Recorders) during the year 2007. The specific MOVES tables [MonthVMTFraction], [DayVMTFraction], and [HourVMTFraction] for VMT fractions are presented in Appendix C.

### 5.2.2.9 Average speed distribution

In MOVES2010b, vehicle power, speed, and acceleration have a significant effect on vehicle emissions for all pollutants. MOVES2010b estimates those emission effects by assigning activity to operating mode distributions, which are determined by the distribution of vehicle hours traveled (VHT) by average speed. As recommended in EPA's technical guidance (US EPA, 2010), estimates of local average speeds were developed by post-processing the output from the 2011 traffic assignment data provided by the MAG transportation modeling group in May 2011. To develop the average speed distribution, VHTs in sixteen speed bins were accumulated separately for each hour of the day, source type, and road type in Maricopa County. Then, the average speed distribution was calculated by normalizing VHTs in sixteen speed bins for each hour of the day, source type, and road type. The same methodology was applied to develop the speed estimates for the eight-hour ozone nonattainment area. The specific MOVES table [AvgSpeedDistribution] for the average speed distribution is presented in Appendix C.

### 5.2.2.10 Ramp fraction

MOVES2010b requires the ramp fraction, which represents the percent of VHT on ramps, on both rural restricted roads (road type 2) and urban restricted roads (road type 4). The fraction of VHT on ramps was derived by dividing the total VHTs on ramps by the total VHTs for each restricted road type. Those VHTs were obtained from the 2011 traffic assignment data provided by the MAG transportation modeling group in May 2011. The specific MOVES table [RoadType] for ramp fractions is presented in Appendix C.

### 5.2.2.11 AVFT strategy

MOVES2010b allows users to modify the fuel engine fraction using different fuels and technologies in each model year in order to reflect the local situation. The fleet information for transit buses for model years 1997 through 2011 was provided by Valley Metro and used to prepare the AVFT input file. Since the fleet data are available only for specific model years, MOVES2010b default values were obtained from the [fuelEngFraction] table in the MOVES default database and used for the rest of the model years. The specific MOVES table [AVFT] for AVFT strategy is presented in Appendix C.

### 5.2.2.12 Stage II refueling control programs

As an option, MOVES2010b allows to apply Stage refueling emission control programs. Since 1994, the Stage II refueling program has been implemented in Area A as one of committed control measures (MAG, 2009). The program efficiency of 46 percent for the refueling displacement vapor losses and the refueling spillage losses are assumed for LDGVs, LDGTs, and HDGVs (Yantorno, 2007). The same program efficiency was applied to the eight-hour ozone nonattainment area and Maricopa County. The specific MOVES table [CountyYear] for Stage II refueling control programs is presented in Appendix C.

### **5.2.3 MOVES2010b outputs**

MOVES2010b was executed with the RunSpec files described in Appendix C to obtain exhaust and evaporative emissions for VOC, NO<sub>x</sub>, and CO. These values were obtained for the following categories by month:

- Vehicle classes: light duty gasoline vehicles (LDGV), light duty gasoline trucks 1 and 2 (LDGT1), light duty gasoline trucks 3 and 4 (LDGT2), heavy duty gasoline vehicles 2B thru 8B and gasoline buses (HDGV), motorcycles (MC), light duty diesel vehicles (LDDV), light duty diesel trucks 1 thru 4 (LDDT), heavy duty diesel vehicles class 2B (2BHDDV), heavy duty diesel vehicles classes 3, 4, and 5 (LHDDV), heavy duty diesel vehicles classes 6 and 7 (MHDDV), heavy duty diesel vehicles classes 8A and 8B (HHDDV), and heavy duty diesel buses (BUSES)
- Facility types: rural interstate, rural principal arterial, rural minor arterial, rural major collector, rural minor collector, rural local, urban interstate, urban freeway/expressway, urban principal arterial, urban minor arterial, urban collector, urban local, and off-network, which was newly added in MOVES2010b
- Days: weekdays and weekend days

### **5.2.4 MOVES2010b emission estimates**

MOVES2010b was used to generate onroad emissions by vehicle class, facility type, weekdays/weekend days, and month. By specifying the output time aggregate level as month, the model produces monthly emissions including weekday and weekend emissions for a given month. The annual emissions were calculated by aggregating monthly onroad emissions derived by MOVES2010b. The ozone season-day emissions were calculated by dividing the three-month peak ozone season emissions from July through September by 92 days.

Tables 5.2–2 and 5.2–3 show the calculated annual and ozone season-day VOC, NO<sub>x</sub>, and CO emissions by facility type and vehicle class in the eight-hour ozone nonattainment area and Maricopa County, respectively.

**Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA.**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
Rural Interstate	LDGV	2201001110	28.13	110.70	758.49	163.3	604.9	5,232.5
	LDGT1	2201020110	51.89	243.02	1,356.15	303.6	1,314.9	9,185.7
	LDGT2	2201040110	26.73	125.19	698.62	156.4	677.4	4,732.0
	HDGV	2201070110	13.02	72.48	319.37	74.6	369.0	1,921.9
	MC	2201080110	6.40	4.22	69.24	34.8	21.0	368.5
	LDDV	2230001110	0.05	0.84	0.40	0.3	4.6	2.7
	LDDT	2230060110	1.62	13.96	8.85	9.2	77.5	60.3
	2BHDDV	2230071110	0.71	6.18	3.89	4.0	34.4	26.5
	LHDDV	2230072110	3.85	32.92	20.87	21.8	182.4	141.9
	MHDDV	2230073110	10.86	164.12	45.16	57.2	807.2	237.2
	HHDDV	2230074110	23.31	570.60	116.92	123.1	2,806.7	614.3
BUSES	2230075110	1.20	23.68	6.14	6.3	116.5	32.3	
Rural Principal Arterial	LDGV	2201001130	20.73	70.04	387.68	119.5	403.2	2,614.6
	LDGT1	2201020130	18.86	76.50	363.07	109.6	434.4	2,408.3
	LDGT2	2201040130	9.72	39.41	187.04	56.5	223.8	1,240.7
	HDGV	2201070130	3.53	17.03	71.63	20.3	90.3	435.2
	MC	2201080130	11.93	6.20	105.39	64.6	31.0	561.0
	LDDV	2230001130	0.04	0.63	0.26	0.2	3.7	1.7
	LDDT	2230060130	0.66	5.13	3.60	3.7	29.9	24.0
	2BHDDV	2230071130	0.29	2.28	1.58	1.6	13.3	10.6
	LHDDV	2230072130	1.57	12.04	8.49	8.8	70.1	56.7
	MHDDV	2230073130	2.27	27.40	8.99	11.9	135.0	47.2
	HHDDV	2230074130	3.98	80.40	19.42	21.0	396.0	102.0
BUSES	2230075130	0.40	6.97	1.97	2.1	34.3	10.3	
Rural Minor Arterial	LDGV	2201001150	20.14	68.06	376.72	116.1	391.8	2,540.7
	LDGT1	2201020150	18.33	74.33	352.81	106.5	422.1	2,340.3
	LDGT2	2201040150	9.44	38.29	181.75	54.9	217.4	1,205.6
	HDGV	2201070150	3.43	16.55	69.61	19.7	87.8	422.9
	MC	2201080150	11.59	6.03	102.42	62.8	30.1	545.1
	LDDV	2230001150	0.04	0.61	0.26	0.2	3.6	1.7
	LDDT	2230060150	0.64	4.98	3.49	3.6	29.0	23.4
	2BHDDV	2230071150	0.28	2.21	1.54	1.6	12.9	10.3
	LHDDV	2230072150	1.53	11.70	8.25	8.6	68.1	55.1
	MHDDV	2230073150	2.20	26.63	8.73	11.6	131.1	45.9
	HHDDV	2230074150	3.87	78.12	18.87	20.4	384.8	99.1
BUSES	2230075150	0.39	6.77	1.91	2.1	33.4	10.0	
Rural Major Collector	LDGV	2201001170	3.75	12.69	70.22	21.6	73.0	473.5
	LDGT1	2201020170	3.42	13.86	65.76	19.9	78.7	436.2
	LDGT2	2201040170	1.76	7.14	33.88	10.2	40.5	224.7
	HDGV	2201070170	0.64	3.08	12.97	3.7	16.4	78.8
	MC	2201080170	2.16	1.12	19.09	11.7	5.6	101.6
	LDDV	2230001170	0.01	0.11	0.05	0.0	0.7	0.3
	LDDT	2230060170	0.12	0.93	0.65	0.7	5.4	4.4
	2BHDDV	2230071170	0.05	0.41	0.29	0.3	2.4	1.9
	LHDDV	2230072170	0.28	2.18	1.54	1.6	12.7	10.3
	MHDDV	2230073170	0.41	4.96	1.63	2.2	24.4	8.5
	HHDDV	2230074170	0.72	14.56	3.52	3.8	71.7	18.5
BUSES	2230075170	0.07	1.26	0.36	0.4	6.2	1.9	

**Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Rural Minor Collector	LDGV	2201001190	0.87	2.94	16.26	5.0	16.9	109.6
	LDGT1	2201020190	0.79	3.21	15.22	4.6	18.2	101.0
	LDGT2	2201040190	0.41	1.65	7.84	2.4	9.4	52.0
	HDGV	2201070190	0.15	0.71	3.00	0.9	3.8	18.2
	MC	2201080190	0.50	0.26	4.42	2.7	1.3	23.5
	LDDV	2230001190	0.00	0.03	0.01	0.0	0.2	0.1
	LDDT	2230060190	0.03	0.21	0.15	0.2	1.3	1.0
	2BHDDV	2230071190	0.01	0.10	0.07	0.1	0.6	0.4
	LHDDV	2230072190	0.07	0.50	0.36	0.4	2.9	2.4
	MHDDV	2230073190	0.10	1.15	0.38	0.5	5.7	2.0
HHDDV	2230074190	0.17	3.37	0.81	0.9	16.6	4.3	
BUSES	2230075190	0.02	0.29	0.08	0.1	1.4	0.4	
Rural Local	LDGV	2201001210	9.08	30.68	169.82	52.3	176.6	1,145.3
	LDGT1	2201020210	8.26	33.51	159.04	48.0	190.3	1,055.0
	LDGT2	2201040210	4.26	17.26	81.93	24.7	98.0	543.5
	HDGV	2201070210	1.55	7.46	31.38	8.9	39.6	190.6
	MC	2201080210	5.22	2.72	46.17	28.3	13.6	245.7
	LDDV	2230001210	0.02	0.27	0.12	0.1	1.6	0.8
	LDDT	2230060210	0.29	2.25	1.58	1.6	13.1	10.5
	2BHDDV	2230071210	0.13	1.00	0.69	0.7	5.8	4.6
	LHDDV	2230072210	0.69	5.27	3.72	3.9	30.7	24.8
	MHDDV	2230073210	0.99	12.00	3.94	5.2	59.1	20.7
HHDDV	2230074210	1.74	35.22	8.51	9.2	173.5	44.7	
BUSES	2230075210	0.18	3.05	0.86	0.9	15.0	4.5	
Urban Interstate	LDGV	2201001230	315.59	1,122.85	8,542.12	1,828.0	6,198.7	58,613.4
	LDGT1	2201020230	389.33	1,602.91	9,784.95	2,271.6	8,744.6	65,893.5
	LDGT2	2201040230	200.56	825.74	5,040.73	1,170.2	4,504.8	33,945.1
	HDGV	2201070230	125.37	594.77	2,799.95	712.5	3,011.8	16,433.1
	MC	2201080230	128.88	73.37	1,238.82	698.9	365.4	6,593.8
	LDDV	2230001230	0.54	8.81	4.59	3.0	49.4	30.9
	LDDT	2230060230	13.00	102.99	71.45	73.3	575.8	483.3
	2BHDDV	2230071230	5.68	45.66	31.36	32.0	255.6	212.6
	LHDDV	2230072230	31.01	242.58	169.13	174.7	1,354.0	1,141.6
	MHDDV	2230073230	93.83	1,316.73	378.86	494.4	6,475.6	1,990.4
HHDDV	2230074230	173.92	3,747.08	854.68	918.0	18,429.4	4,490.3	
BUSES	2230075230	14.35	272.67	73.30	75.6	1,341.1	385.1	
Urban Freeway And Express- way	LDGV	2201001250	331.11	1,178.07	8,962.22	1,917.9	6,503.5	61,496.0
	LDGT1	2201020250	408.48	1,681.74	10,266.18	2,383.3	9,174.7	69,134.0
	LDGT2	2201040250	210.43	866.35	5,288.63	1,227.8	4,726.3	35,614.5
	HDGV	2201070250	131.53	624.02	2,937.66	747.5	3,160.0	17,241.3
	MC	2201080250	135.22	76.98	1,299.75	733.2	383.3	6,918.1
	LDDV	2230001250	0.56	9.25	4.82	3.2	51.9	32.4
	LDDT	2230060250	13.64	108.06	74.96	76.9	604.1	507.1
	2BHDDV	2230071250	5.96	47.91	32.90	33.6	268.2	223.0
	LHDDV	2230072250	32.53	254.51	177.45	183.3	1,420.6	1,197.8
	MHDDV	2230073250	98.44	1,381.48	397.49	518.7	6,794.1	2,088.3
HHDDV	2230074250	182.48	3,931.36	896.71	963.2	19,335.8	4,711.2	
BUSES	2230075250	15.05	286.08	76.90	79.3	1,407.1	404.0	

**Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Urban Principal Arterial	LDGV	2201001270	867.65	2,461.71	14,822.61	4,980.2	14,626.5	98,722.0
	LDGT1	2201020270	723.35	2,268.85	11,877.79	4,187.4	13,305.9	77,666.8
	LDGT2	2201040270	372.63	1,168.80	6,118.85	2,157.1	6,854.6	40,010.1
	HDGV	2201070270	159.42	526.27	2,610.59	907.1	2,833.3	15,528.2
	MC	2201080270	364.35	120.97	2,387.52	1,968.4	603.7	12,707.9
	LDDV	2230001270	1.49	24.89	10.67	8.3	150.4	69.4
	LDDT	2230060270	25.26	203.10	142.81	141.2	1,229.5	939.0
	2BHDDV	2230071270	11.03	90.29	62.60	61.7	547.5	412.4
	LHDDV	2230072270	60.30	478.09	338.58	336.9	2,889.2	2,221.8
	MHDDV	2230073270	99.13	1,116.86	362.02	522.0	5,499.7	1,901.7
HHDDV	2230074270	167.56	2,988.26	778.64	883.9	14,715.7	4,090.3	
BUSES	2230075270	14.31	229.46	66.76	75.4	1,130.0	350.7	
Urban Minor Arterial	LDGV	2201001290	441.02	1,251.27	7,534.27	2,531.4	7,434.6	50,180.0
	LDGT1	2201020290	367.67	1,153.25	6,037.43	2,128.4	6,763.4	39,477.6
	LDGT2	2201040290	189.41	594.10	3,110.19	1,096.5	3,484.2	20,337.0
	HDGV	2201070290	81.03	267.50	1,326.95	461.1	1,440.2	7,892.9
	MC	2201080290	185.20	61.49	1,213.57	1,000.5	306.8	6,459.4
	LDDV	2230001290	0.76	12.65	5.42	4.2	76.4	35.3
	LDDT	2230060290	12.84	103.24	72.59	71.8	625.0	477.3
	2BHDDV	2230071290	5.61	45.89	31.82	31.4	278.3	209.6
	LHDDV	2230072290	30.65	243.01	172.10	171.2	1,468.6	1,129.3
	MHDDV	2230073290	50.39	567.70	184.01	265.3	2,795.5	966.6
HHDDV	2230074290	85.17	1,518.92	395.78	449.3	7,479.9	2,079.1	
BUSES	2230075290	7.27	116.63	33.93	38.3	574.4	178.3	
Urban Collector	LDGV	2201001310	86.13	244.37	1,471.39	494.4	1,451.9	9,799.8
	LDGT1	2201020310	71.80	225.22	1,179.07	415.7	1,320.8	7,709.7
	LDGT2	2201040310	36.99	116.02	607.40	214.1	680.4	3,971.7
	HDGV	2201070310	15.82	52.24	259.14	90.0	281.3	1,541.4
	MC	2201080310	36.17	12.01	237.00	195.4	59.9	1,261.5
	LDDV	2230001310	0.15	2.47	1.06	0.8	14.9	6.9
	LDDT	2230060310	2.51	20.16	14.18	14.0	122.1	93.2
	2BHDDV	2230071310	1.10	8.96	6.21	6.1	54.4	40.9
	LHDDV	2230072310	5.99	47.46	33.61	33.4	286.8	220.5
	MHDDV	2230073310	9.84	110.87	35.94	51.8	545.9	188.8
HHDDV	2230074310	16.63	296.63	77.29	87.7	1,460.8	406.0	
BUSES	2230075310	1.42	22.78	6.63	7.5	112.2	34.8	
Urban Local	LDGV	2201001330	415.75	1,179.56	7,102.48	2,386.3	7,008.5	47,304.1
	LDGT1	2201020330	346.60	1,087.15	5,691.42	2,006.4	6,375.7	37,215.2
	LDGT2	2201040330	178.55	560.05	2,931.94	1,033.6	3,284.5	19,171.4
	HDGV	2201070330	76.39	252.17	1,250.90	434.7	1,357.6	7,440.6
	MC	2201080330	174.58	57.96	1,144.02	943.2	289.2	6,089.2
	LDDV	2230001330	0.71	11.93	5.11	4.0	72.0	33.3
	LDDT	2230060330	12.11	97.32	68.43	67.7	589.1	449.9
	2BHDDV	2230071330	5.29	43.26	30.00	29.6	262.4	197.6
	LHDDV	2230072330	28.89	229.09	162.23	161.4	1,384.4	1,064.6
	MHDDV	2230073330	47.50	535.16	173.46	250.1	2,635.3	911.2
HHDDV	2230074330	80.29	1,431.87	373.10	423.5	7,051.3	1,960.0	
BUSES	2230075330	6.86	109.95	31.99	36.1	541.4	168.1	

**Table 5.2–2. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in the eight-hour ozone NAA (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
	LDGV	220100100	9,402.26	4,424.20	43,163.97	61,052.9	23,759.3	183,525.8
	LDGT1	220102000	2,588.87	1,468.89	19,360.70	16,455.7	7,981.9	96,124.0
	LDGT2	220104000	1,333.66	756.70	9,973.69	8,477.2	4,111.9	49,518.4
	HDGV	220107000	372.55	217.03	4,052.96	2,338.4	1,182.2	20,958.3
	MC	220108000	547.02	2.43	83.60	4,271.9	9.8	208.1
Off- Network	LDDV	223000100	6.48	27.63	25.05	22.4	120.8	131.4
	LDDT	223006000	3.32	26.59	16.91	7.6	120.8	87.9
	2BHDDV	223007100	1.42	11.66	7.35	3.2	52.9	38.2
	LHDDV	223007200	7.79	62.35	39.03	17.8	283.1	202.6
	MHDDV	223007300	24.50	144.11	189.20	112.6	621.4	1,016.4
	HHDDV	223007400	418.93	2,672.32	1,119.58	2,179.6	12,161.2	5,908.3
	BUSES	223007500	1.63	4.45	96.15	0.1	0.0	522.5

**Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County.**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Rural Interstate	LDGV	2201001110	41.81	166.74	1,147.40	242.9	911.2	7,919.6
	LDGT1	2201020110	100.56	475.25	2,658.13	588.5	2,571.6	18,011.7
	LDGT2	2201040110	51.80	244.83	1,369.34	303.2	1,324.8	9,278.8
	HDGV	2201070110	21.52	118.92	538.20	123.8	610.0	3,301.0
	MC	2201080110	11.22	7.49	122.76	61.0	37.3	653.4
	LDDV	2230001110	0.07	1.25	0.60	0.4	6.9	4.1
	LDDT	2230060110	3.14	27.11	17.13	17.7	150.4	116.7
	2BHDDV	2230071110	1.37	12.00	7.53	7.8	66.7	51.4
	LHDDV	2230072110	7.47	63.90	40.44	42.2	354.2	275.0
	MHDDV	2230073110	17.23	281.49	73.31	90.8	1,384.5	385.2
HHDDV	2230074110	45.10	1,129.87	228.30	238.2	5,557.7	1,199.4	
BUSES	2230075110	1.71	34.23	8.79	9.0	168.4	46.2	
Rural Principal Arterial	LDGV	2201001130	33.65	113.61	629.45	193.9	654.0	4,244.8
	LDGT1	2201020130	36.88	149.19	708.92	214.4	847.2	4,701.6
	LDGT2	2201040130	19.00	76.86	365.20	110.4	436.4	2,422.1
	HDGV	2201070130	6.69	31.89	135.07	38.5	169.7	824.3
	MC	2201080130	21.15	10.98	186.63	114.5	54.8	993.4
	LDDV	2230001130	0.06	1.02	0.43	0.3	5.9	2.8
	LDDT	2230060130	1.30	10.05	7.05	7.3	58.6	47.1
	2BHDDV	2230071130	0.57	4.46	3.10	3.2	26.1	20.7
	LHDDV	2230072130	3.08	23.59	16.65	17.3	137.3	111.1
	MHDDV	2230073130	4.17	51.42	16.61	22.0	253.2	87.3
HHDDV	2230074130	7.84	159.49	38.37	41.4	785.5	201.6	
BUSES	2230075130	0.72	12.48	3.53	3.8	61.5	18.5	
Rural Minor Arterial	LDGV	2201001150	32.70	110.40	611.65	188.5	635.5	4,124.9
	LDGT1	2201020150	35.84	144.97	688.88	208.3	823.2	4,568.7
	LDGT2	2201040150	18.46	74.68	354.88	107.3	424.1	2,353.6
	HDGV	2201070150	6.50	30.98	131.25	37.4	164.9	801.0
	MC	2201080150	20.55	10.67	181.35	111.3	53.2	965.3
	LDDV	2230001150	0.06	0.99	0.42	0.3	5.8	2.8
	LDDT	2230060150	1.26	9.76	6.85	7.1	56.9	45.8
	2BHDDV	2230071150	0.55	4.34	3.01	3.1	25.3	20.2
	LHDDV	2230072150	2.99	22.92	16.18	16.8	133.4	107.9
	MHDDV	2230073150	4.05	49.96	16.14	21.3	246.1	84.8
HHDDV	2230074150	7.62	154.98	37.28	40.2	763.3	195.9	
BUSES	2230075150	0.70	12.13	3.43	3.7	59.8	18.0	
Rural Major Collector	LDGV	2201001170	6.09	20.58	114.00	35.1	118.4	768.8
	LDGT1	2201020170	6.68	27.02	128.40	38.8	153.4	851.6
	LDGT2	2201040170	3.44	13.92	66.14	20.0	79.0	438.7
	HDGV	2201070170	1.21	5.78	24.46	7.0	30.7	149.3
	MC	2201080170	3.83	1.99	33.80	20.7	9.9	179.9
	LDDV	2230001170	0.01	0.18	0.08	0.1	1.1	0.5
	LDDT	2230060170	0.23	1.82	1.28	1.3	10.6	8.5
	2BHDDV	2230071170	0.10	0.81	0.56	0.6	4.7	3.8
	LHDDV	2230072170	0.56	4.27	3.01	3.1	24.9	20.1
	MHDDV	2230073170	0.76	9.31	3.01	4.0	45.9	15.8
HHDDV	2230074170	1.42	28.89	6.95	7.5	142.3	36.5	
BUSES	2230075170	0.13	2.26	0.64	0.7	11.1	3.4	

**Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
Rural Minor Collector	LDGV	2201001190	1.41	4.76	26.39	8.1	27.4	178.0
	LDGT1	2201020190	1.55	6.26	29.73	9.0	35.5	197.1
	LDGT2	2201040190	0.80	3.22	15.31	4.6	18.3	101.6
	HDGV	2201070190	0.28	1.34	5.66	1.6	7.1	34.6
	MC	2201080190	0.89	0.46	7.83	4.8	2.3	41.7
	LDDV	2230001190	0.00	0.04	0.02	0.0	0.2	0.1
	LDDT	2230060190	0.05	0.42	0.30	0.3	2.5	2.0
	2BHDDV	2230071190	0.02	0.19	0.13	0.1	1.1	0.9
	LHDDV	2230072190	0.13	0.99	0.70	0.7	5.8	4.7
	MHDDV	2230073190	0.17	2.16	0.70	0.9	10.6	3.7
HHDDV	2230074190	0.33	6.69	1.61	1.7	32.9	8.5	
BUSES	2230075190	0.03	0.52	0.15	0.2	2.6	0.8	
Rural Local	LDGV	2201001210	14.74	49.77	275.73	85.0	286.5	1,859.5
	LDGT1	2201020210	16.15	65.35	310.54	93.9	371.1	2,059.6
	LDGT2	2201040210	8.32	33.67	159.98	48.4	191.2	1,061.0
	HDGV	2201070210	2.93	13.97	59.17	16.8	74.3	361.1
	MC	2201080210	9.27	4.81	81.75	50.2	24.0	435.1
	LDDV	2230001210	0.03	0.45	0.19	0.1	2.6	1.2
	LDDT	2230060210	0.57	4.40	3.09	3.2	25.7	20.6
	2BHDDV	2230071210	0.25	1.96	1.36	1.4	11.4	9.1
	LHDDV	2230072210	1.35	10.33	7.29	7.6	60.1	48.7
	MHDDV	2230073210	1.83	22.52	7.28	9.6	110.9	38.2
HHDDV	2230074210	3.43	69.87	16.81	18.1	344.1	88.3	
BUSES	2230075210	0.31	5.47	1.55	1.7	26.9	8.1	
Urban Interstate	LDGV	2201001230	321.75	1,147.02	8,736.08	1,863.8	6,328.9	59,952.7
	LDGT1	2201020230	398.95	1,645.13	10,050.63	2,327.9	8,971.4	67,690.5
	LDGT2	2201040230	205.52	847.49	5,177.59	1,199.2	4,621.6	34,870.8
	HDGV	2201070230	129.18	613.34	2,887.04	734.1	3,105.0	16,939.0
	MC	2201080230	131.85	75.30	1,270.33	715.0	375.0	6,761.5
	LDDV	2230001230	0.55	8.99	4.69	3.1	50.4	31.5
	LDDT	2230060230	13.33	105.63	73.26	75.1	590.3	495.6
	2BHDDV	2230071230	5.82	46.83	32.15	32.9	262.1	218.0
	LHDDV	2230072230	31.79	248.83	173.43	179.1	1,388.4	1,170.7
	MHDDV	2230073230	96.93	1,361.53	391.49	510.7	6,696.0	2,056.8
HHDDV	2230074230	179.94	3,879.33	884.45	949.8	19,079.9	4,646.8	
BUSES	2230075230	14.81	281.59	75.68	78.0	1,385.0	397.6	
Urban Freeway and Express- way	LDGV	2201001250	337.58	1,203.43	9,165.73	1,955.5	6,640.2	62,901.2
	LDGT1	2201020250	418.57	1,726.04	10,544.93	2,442.3	9,412.6	71,019.7
	LDGT2	2201040250	215.63	889.17	5,432.23	1,258.2	4,848.9	36,585.8
	HDGV	2201070250	135.53	643.51	3,029.03	770.2	3,257.7	17,772.0
	MC	2201080250	138.33	79.00	1,332.81	750.1	393.4	7,094.0
	LDDV	2230001250	0.58	9.43	4.92	3.2	52.9	33.1
	LDDT	2230060250	13.98	110.83	76.86	78.8	619.4	519.9
	2BHDDV	2230071250	6.11	49.13	33.73	34.5	275.0	228.7
	LHDDV	2230072250	33.36	261.06	181.96	187.9	1,456.7	1,228.3
	MHDDV	2230073250	101.70	1,428.49	410.75	535.8	7,025.3	2,158.0
HHDDV	2230074250	188.78	4,070.12	927.95	996.5	20,018.3	4,875.3	
BUSES	2230075250	15.54	295.43	79.40	81.9	1,453.1	417.2	

**Table 5.2–3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NOx	CO	VOC	NOx	CO
Urban Principal Arterial	LDGV	2201001270	887.40	2,518.28	15,177.93	5,093.7	14,946.0	101,100.4
	LDGT1	2201020270	740.73	2,323.35	12,173.14	4,288.1	13,611.0	79,607.5
	LDGT2	2201040270	381.59	1,196.87	6,271.01	2,209.0	7,011.7	41,009.9
	HDGV	2201070270	163.87	541.20	2,685.49	932.4	2,910.9	15,968.7
	MC	2201080270	372.91	123.95	2,445.17	2,014.6	618.5	13,014.7
	LDDV	2230001270	1.53	25.46	10.92	8.5	153.6	71.0
	LDDT	2230060270	25.87	207.85	146.31	144.6	1,256.8	962.1
	2BHDDV	2230071270	11.30	92.40	64.13	63.2	559.6	422.5
	LHDDV	2230072270	61.76	489.28	346.88	345.0	2,953.3	2,276.6
	MHDDV	2230073270	102.21	1,151.68	373.34	538.2	5,671.2	1,961.2
HHDDV	2230074270	172.44	3,077.56	801.69	909.6	15,155.6	4,211.4	
BUSES	2230075270	14.77	236.81	68.89	77.8	1,166.2	361.9	
Urban Minor Arterial	LDGV	2201001290	451.06	1,280.03	7,714.88	2,589.1	7,597.0	51,389.0
	LDGT1	2201020290	376.51	1,180.95	6,187.56	2,179.6	6,918.4	40,464.2
	LDGT2	2201040290	193.96	608.37	3,187.53	1,122.8	3,564.0	20,845.2
	HDGV	2201070290	83.30	275.09	1,365.02	473.9	1,479.6	8,116.9
	MC	2201080290	189.55	63.00	1,242.87	1,024.0	314.4	6,615.3
	LDDV	2230001290	0.78	12.94	5.55	4.3	78.1	36.1
	LDDT	2230060290	13.15	105.65	74.37	73.5	638.8	489.0
	2BHDDV	2230071290	5.74	46.97	32.60	32.1	284.5	214.8
	LHDDV	2230072290	31.39	248.70	176.32	175.4	1,501.2	1,157.2
	MHDDV	2230073290	51.95	585.39	189.77	273.6	2,882.6	996.9
HHDDV	2230074290	87.65	1,564.31	407.50	462.3	7,703.5	2,140.7	
BUSES	2230075290	7.51	120.37	35.02	39.5	592.8	184.0	
Urban Collector	LDGV	2201001310	88.09	249.98	1,506.66	505.6	1,483.6	10,035.9
	LDGT1	2201020310	73.53	230.63	1,208.39	425.7	1,351.1	7,902.4
	LDGT2	2201040310	37.88	118.81	622.50	219.3	696.0	4,070.9
	HDGV	2201070310	16.27	53.72	266.58	92.6	289.0	1,585.2
	MC	2201080310	37.02	12.30	242.72	200.0	61.4	1,291.9
	LDDV	2230001310	0.15	2.53	1.08	0.8	15.2	7.1
	LDDT	2230060310	2.57	20.63	14.52	14.4	124.8	95.5
	2BHDDV	2230071310	1.12	9.17	6.37	6.3	55.6	41.9
	LHDDV	2230072310	6.13	48.57	34.43	34.3	293.2	226.0
	MHDDV	2230073310	10.15	114.32	37.06	53.4	563.0	194.7
HHDDV	2230074310	17.12	305.50	79.58	90.3	1,504.4	418.1	
BUSES	2230075310	1.47	23.51	6.84	7.7	115.8	35.9	
Urban Local	LDGV	2201001330	425.21	1,206.67	7,272.74	2,440.7	7,161.6	48,443.8
	LDGT1	2201020330	354.93	1,113.27	5,832.94	2,054.7	6,521.9	38,145.1
	LDGT2	2201040330	182.84	573.50	3,004.85	1,058.5	3,359.8	19,650.5
	HDGV	2201070330	78.52	259.32	1,286.79	446.8	1,394.8	7,651.6
	MC	2201080330	178.68	59.39	1,171.64	965.3	296.4	6,236.2
	LDDV	2230001330	0.73	12.20	5.23	4.1	73.6	34.0
	LDDT	2230060330	12.40	99.59	70.11	69.3	602.2	461.0
	2BHDDV	2230071330	5.41	44.27	30.73	30.3	268.2	202.5
	LHDDV	2230072330	29.59	234.45	166.21	165.3	1,415.1	1,090.9
	MHDDV	2230073330	48.97	551.84	178.89	257.9	2,717.4	939.8
HHDDV	2230074330	82.63	1,474.66	384.14	435.8	7,262.0	2,018.0	
BUSES	2230075330	7.08	113.47	33.01	37.3	558.8	173.4	

**Table 5.2-3. Annual and ozone season-day onroad mobile source emissions by facility type and vehicle class in Maricopa County (continued).**

Facility Type	Vehicle Class	SCC	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
			VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
	LDGV	2201001000	9,343.57	4,398.52	42,913.45	60,666.2	23,621.4	182,460.8
	LDGT1	2201020000	2,565.00	1,457.16	19,206.53	16,298.8	7,918.2	95,359.0
	LDGT2	2201040000	1,321.36	750.66	9,894.27	8,396.3	4,079.0	49,124.2
	HDGV	2201070000	369.74	215.64	4,033.93	2,320.0	1,174.6	20,862.9
	MC	2201080000	539.75	2.40	82.65	4,215.5	9.7	205.7
Off-	LDDV	2230001000	6.44	27.47	24.90	22.3	120.1	130.6
Network	LDDT	2230060000	3.29	26.39	16.79	7.6	119.8	87.2
	2BHDDV	2230071000	1.41	11.57	7.30	3.2	52.5	37.9
	LHDDV	2230072000	7.74	61.88	38.74	17.6	281.0	201.1
	MHDDV	2230073000	26.03	153.86	192.53	120.6	666.0	1,033.9
	HHDDV	2230074000	448.68	2,863.21	1,186.93	2,336.0	13,033.7	6,262.1
	BUSES	2230075000	1.62	4.42	95.35	0.1	0.0	518.1

### 5.3 Summary of ozone precursor emissions from onroad mobile sources

Tables 5.3–1 and 5.3–2 show the annual and ozone season-day onroad mobile source emissions by facility type in the eight-hour ozone nonattainment area and Maricopa County, respectively.

**Table 5.3–1. Annual and ozone season-day onroad mobile source emissions by facility type in the eight-hour ozone NAA.**

Facility Type	Annual emissions (tons/year)			Season-day emissions (lbs/day)			
	VOC	NOx	CO	VOC	NOx	CO	
Rural	Interstate	167.77	1,367.91	3,404.10	954.6	7,016.5	22,555.8
	Principal Arterial	73.98	344.03	1,159.12	419.8	1,865.0	7,512.3
	Minor Arterial	71.88	334.28	1,126.36	408.1	1,812.1	7,300.1
	Major Collector	13.39	62.30	209.96	76.1	337.7	1,360.6
	Minor Collector	3.12	14.42	48.60	17.8	78.3	314.9
	Local	32.41	150.69	507.76	183.8	816.9	3,290.7
Urban	Interstate	1,492.06	9,956.16	28,989.94	8,452.2	51,306.2	190,213.1
	Freeway/Expressway	1,565.43	10,445.81	30,415.67	8,867.9	53,829.6	199,567.7
	Principal Arterial	2,866.48	11,677.55	39,579.44	16,229.6	64,386.0	254,620.3
	Minor Arterial	1,457.02	5,935.65	20,118.06	8,249.4	32,727.3	129,422.4
	Collector	284.55	1,159.19	3,928.92	1,610.9	6,391.4	25,275.2
	Local	1,373.52	5,595.47	18,965.08	7,776.6	30,851.4	122,005.2
Off-network	14,708.43	9,818.36	78,128.19	94,939.4	50,405.3	358,241.9	
<b>Total</b>	<b>24,110.04</b>	<b>56,861.82</b>	<b>226,581.20</b>	<b>148,186.2</b>	<b>301,823.7</b>	<b>1,321,680.2</b>	

**Table 5.3–2. Annual and ozone season-day onroad mobile source emissions by facility type in Maricopa County.**

Facility Type	Annual emissions (tons/year)			Season-day emissions (lbs/day)			
	VOC	NOx	CO	VOC	NOx	CO	
Rural	Interstate	303.00	2,563.08	6,211.93	1,725.5	13,143.7	41,242.5
	Principal Arterial	135.11	645.04	2,111.01	767.0	3,490.2	13,675.3
	Minor Arterial	131.28	626.78	2,051.32	745.3	3,391.5	13,288.9
	Major Collector	24.46	116.83	382.33	138.9	632.0	2,476.9
	Minor Collector	5.66	27.05	88.53	32.0	146.3	573.7
	Local	59.18	282.57	924.74	336.0	1,528.8	5,990.5
Urban	Interstate	1,530.42	10,261.01	29,756.82	8,668.7	52,854.0	195,231.5
	Freeway/Expressway	1,605.69	10,765.64	31,220.30	9,094.9	55,453.5	204,833.2
	Principal Arterial	2,936.38	11,984.69	40,564.90	16,624.7	66,014.4	260,967.9
	Minor Arterial	1,492.55	6,091.77	20,618.99	8,450.1	33,554.9	132,649.3
	Collector	291.50	1,189.67	4,026.73	1,650.4	6,553.1	25,905.5
	Local	1,406.99	5,742.63	19,437.28	7,966.0	31,631.8	125,046.8
Off-network	14,634.63	9,973.18	77,693.37	94,404.2	51,076.0	356,283.5	
<b>Total</b>	<b>24,556.85</b>	<b>60,269.94</b>	<b>235,088.25</b>	<b>150,603.7</b>	<b>319,470.2</b>	<b>1,378,165.5</b>	

Tables 5.3–3 and 5.3–4 present the same emissions by vehicle class in the eight-hour ozone nonattainment area and Maricopa County, respectively.

**Table 5.3–3. Annual and ozone season-day onroad mobile source emissions by vehicle class in the eight-hour ozone NAA.**

Vehicle Class	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
LDGV	11,942.21	12,157.14	93,378.25	75,668.9	68,649.4	521,757.3
LDGT1	4,997.65	9,932.44	66,509.59	30,440.7	56,125.6	408,747.3
LDGT2	2,574.55	5,116.70	34,262.49	15,681.6	28,913.2	210,566.7
HDGV	984.43	2,651.31	15,746.11	5,819.4	13,873.3	90,103.4
MC	1,609.22	425.76	7,951.01	10,016.4	2,120.7	42,083.4
LDDV	10.85	100.12	57.82	46.7	550.2	346.9
LDDT	86.04	688.92	479.65	471.5	4,022.6	3,161.3
2BHDDV	37.56	305.81	210.30	205.9	1,788.7	1,388.6
LHDDV	205.15	1,621.70	1,135.36	1,123.8	9,453.6	7,469.4
MHDDV	440.46	5,409.17	1,789.81	2,303.5	26,530.0	9,424.9
HHDDV	1,158.77	17,368.71	4,663.83	6,083.6	84,483.4	24,528.1
BUSES	63.15	1,084.04	396.98	324.2	5,313.0	2,102.9
<b>Total</b>	<b>24,110.04</b>	<b>56,861.82</b>	<b>226,581.20</b>	<b>148,186.2</b>	<b>301,823.7</b>	<b>1,321,680.2</b>

**Table 5.3–4. Annual and ozone season-day onroad mobile source emissions by vehicle class in Maricopa County.**

Vehicle Class	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
LDGV	11,985.06	12,469.79	95,292.09	75,868.1	70,411.7	535,379.4
LDGT1	5,125.88	10,544.57	69,728.72	31,170.0	59,506.6	430,578.7
LDGT2	2,640.60	5,432.05	35,920.83	16,057.2	30,654.8	221,813.1
HDGV	1,015.54	2,804.70	16,447.69	5,995.1	14,668.3	94,367.6
MC	1,655.00	451.74	8,402.31	10,247.0	2,250.3	44,488.1
LDDV	10.99	102.95	59.03	47.5	566.4	354.9
LDDT	91.14	730.13	507.92	500.2	4,256.8	3,351.0
2BHDDV	39.77	324.10	222.70	218.7	1,892.8	1,472.4
LHDDV	217.34	1,718.77	1,202.24	1,192.3	10,004.6	7,918.3
MHDDV	466.15	5,763.97	1,890.88	2,438.8	28,272.7	9,956.3
HHDDV	1,242.98	18,784.48	5,001.56	6,527.4	91,383.2	26,302.6
BUSES	66.40	1,142.69	412.28	341.4	5,602.0	2,183.1
<b>Total</b>	<b>24,556.85</b>	<b>60,269.94</b>	<b>235,088.25</b>	<b>150,603.7</b>	<b>319,470.2</b>	<b>1,378,165.5</b>

Table 5.3–5 summarizes annual and ozone season-day emissions for VOC, NO<sub>x</sub>, and CO from all onroad mobile sources in the eight-hour ozone nonattainment area and Maricopa County in 2011.

**Table 5.3–5. Annual and ozone season-day emissions from all onroad mobile sources in the eight-hour ozone NAA and Maricopa County.**

	Annual emissions (tons/year)			Season-day emissions (lbs/day)		
	VOC	NO <sub>x</sub>	CO	VOC	NO <sub>x</sub>	CO
8-hr ozone NAA	24,110.04	56,861.82	226,581.20	148,186.2	301,823.7	1,321,680.2
Maricopa County	24,556.85	60,269.94	235,088.25	150,603.7	319,470.2	1,378,165.5

## **5.4 Quality assurance process**

### **5.4.1 VMT estimates**

Normal quality assurance procedures, including automated and manual consistency checks, were conducted by MAG in developing the 2011 TransCAD traffic assignment network used to generate the VMT data. The VMT estimates using the MAG travel demand model have been validated by the MAG transportation modeling group.

### **5.4.2 Emission estimates**

The quality assurance process performed on the MOVES2010b analyses included accuracy, completeness, and reasonableness checks. For accuracy and completeness, all calculations were checked by an independent reviewer. Any errors found were corrected and the corrections were then rechecked by the reviewer.

### **5.4.3 Draft emissions inventory for ozone precursors**

The draft onroad mobile source portion of the 2011 periodic emissions inventory for ozone precursors was reviewed using published EPA quality review guidelines for base year emissions inventories (EPA, 1992b). The procedure review (Levels I, II, and III) included checks for completeness, consistency, and the correct use of appropriate procedures.

## **5.5 References**

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